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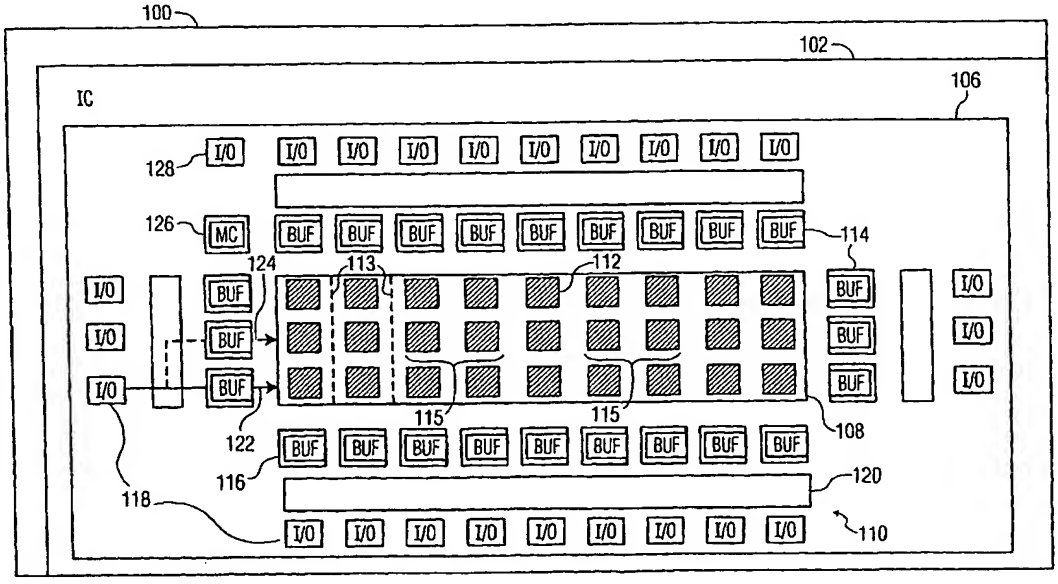
(54) Title: MODULAR INTEGRATION OF AN ARRAY PROCESSOR WITHIN A SYSTEM ON CHIP



(57) Abstract: A systolic array processor is integrated within a system on chip (SoC) in a format that is compatible with existing and emerging SoC technologies. The systolic array processor may be implemented as a co-processor to a general-purpose digital signal processor or as a functional unit of a very long instruction word (VLIW) processor.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F15/76 G06F9/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	MIYAMORI T ET AL: "REMARC: RECONFIGURABLE MULTIMEDIA ARRAY COPROCESSOR" IEICE TRANSACTIONS ON INFORMATION AND SYSTEMS, INSTITUTE OF ELECTRONICS INFORMATION AND COMM. ENG. TOKYO, JP, vol. E82-D, no. 2, February 1999 (1999-02), pages 389-397, XP000821922 ISSN: 0916-8532 the whole document -/--	1-20

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
23 December 2004	30/12/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Michel, T

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CUCCHIARA R ET AL: "RECONFIGURING THE BOUNDARIES OF A MESH-CONNECTED ARRAY OF PROCESSORS WITH RUN-TIME PROGRAMMABLE LOGIC" MICROPROCESSORS AND MICROSYSTEMS, IPC BUSINESS PRESS LTD. LONDON, GB, vol. 17, no. 2, January 1993 (1993-01), pages 67-73, XP000355541 ISSN: 0141-9331 page 68, left-hand column, line 37 - line 69 page 69, right-hand column, line 22 - line 32; figure 1	1-20
X	BARAT F ET AL INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS: "Reconfigurable instruction set processors: an implementation platform for interactive multimedia applications" CONFERENCE RECORD OF THE 35TH. ASILOMAR CONFERENCE ON SIGNALS, SYSTEMS, & COMPUTERS. PACIFIC GROOVE, CA, NOV. 4 - 7, 2001, ASILOMAR CONFERENCE ON SIGNALS, SYSTEMS AND COMPUTERS, NEW YORK, NY : IEEE, US, vol. VOL. 1 OF 2. CONF. 35, 4 November 2001 (2001-11-04), pages 481-485, XP010580968 ISBN: 0-7803-7147-X page 482, paragraph 2 - page 484	13-19
X	CALLAHAN T J ET AL: "THE GARP ARCHITECTURE AND C COMPILER" COMPUTER, IEEE COMPUTER SOCIETY, LONG BEACH., CA, US, US, vol. 33, no. 4, April 2000 (2000-04), pages 62-69, XP000948675 ISSN: 0018-9162	1,6,7,20
A	the whole document	13
A	SINGH H ET AL: "MorphoSys: a reconfigurable architecture for multimedia applications" INTEGRATED CIRCUIT DESIGN, 1998. PROCEEDINGS. XI BRAZILIAN SYMPOSIUM ON RIO DE JANEIRO, BRAZIL 30 SEPT.-3 OCT. 1998, LOS ALAMITOS, CA, USA,IEEE COMPUT. SOC, US, 30 September 1998 (1998-09-30), pages 134-139, XP010303762 ISBN: 0-8186-8704-5 the whole document	1-20

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB 03/05625

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	YATES R B ET AL: "AN ARRAY PROCESSOR FOR GENERAL PURPOSE DIGITAL IMAGE COMPRESSION" IEEE JOURNAL OF SOLID-STATE CIRCUITS, IEEE INC. NEW YORK, US, vol. 30, no. 3, 1 March 1995 (1995-03-01), pages 244-249, XP000502810 ISSN: 0018-9200 the whole document	1-20
A	WO 94/06077 A (SIEMENS AG ; BUCHENRIEDER KLAUS (DE)) 17 March 1994 (1994-03-17) the whole document	1-20
A	PRADO E R ET AL: "A high performance COTS based vector processor for space" MAPLD CONFERENCE, XX, XX, 28 September 1999 (1999-09-28), pages 1-6, XP002207357 the whole document	1,11-13, 20

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

Inter[redacted]nal A[redacted]n No
PCT/IB 03/05625

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9406077 A	17-03-1994	WO 9406077 A1	17-03-1994
		DE 59301609 D1	21-03-1996
		DK 657044 T3	25-03-1996
		EP 0657044 A1	14-06-1995
		ES 2083296 T3	01-04-1996